



# Fact Sheet

US Army Engineer  
Research and Development Center  
Waterways Experiment Station

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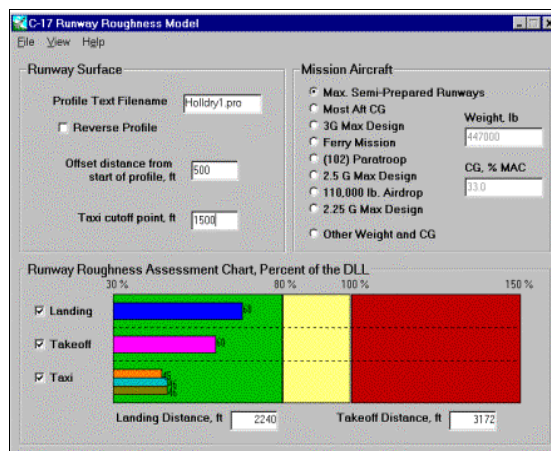
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## C-17 Runway Roughness Model For Semi-Prepared Airfields

**Purpose:** Develop a runway roughness model capable of evaluating the surface condition of semi-prepared airfields for C-17 landing and takeoff operations.

**Background:** During landing, takeoff, and taxi operations all aircraft are subjected to dynamic forces induced by the roughness of the pavement surface. Aircraft landing gear components are designed to absorb and prevent impact forces from exceeding the structural limits of the gear components. Increased roughness due to the irregularities, deterioration, or construction imperfections of a pavement surface could significantly increase these impact forces to limits that are not safe or tolerable by the aircraft landing gear. The C-17 aircraft was designed to operate on substandard or semi-prepared airstrips. The fact that these types of airstrips are usually rougher than paved runways makes it very important, in terms of aircraft structural integrity and mission safety, to evaluate the roughness characteristics of semi-prepared airfield and its influence of the aircraft's structural components.

**Facts:** The US Army Engineer Waterways Experiment Station (WES) developed a numerical model for the prediction of runway roughness of semi-prepared airfields for C-17 ground operations. The assessment of potential damage to the C-17 aircraft due to runway roughness was expressed in terms of the gear forces imposed on the aircraft during landing and takeoffs. These gear forces were compared against gear load design limits from which the runway surface was then categorized to be in GREEN, AMBER, or RED condition. This numerical model is based on actual aircraft performance data and surface profile data collected at six semi-prepared runways during C-17 flight testing. Comparable numerical models for other types of aircraft are also available and can be readily modified to evaluate special conditions.



**Point of Contact:** For more information regarding the C-17 Runway Roughness Model, contact Mr. Carlos R. Gonzalez at (601) 634-2647 or e-mail at [gonzalc@wes.army.mil](mailto:gonzalc@wes.army.mil). General information on WES is available on the web site at <http://www.wes.army.mil>.